A CAHNERS PUBLICATION

124589 C1850-5

NOVEMBER 15, 1988

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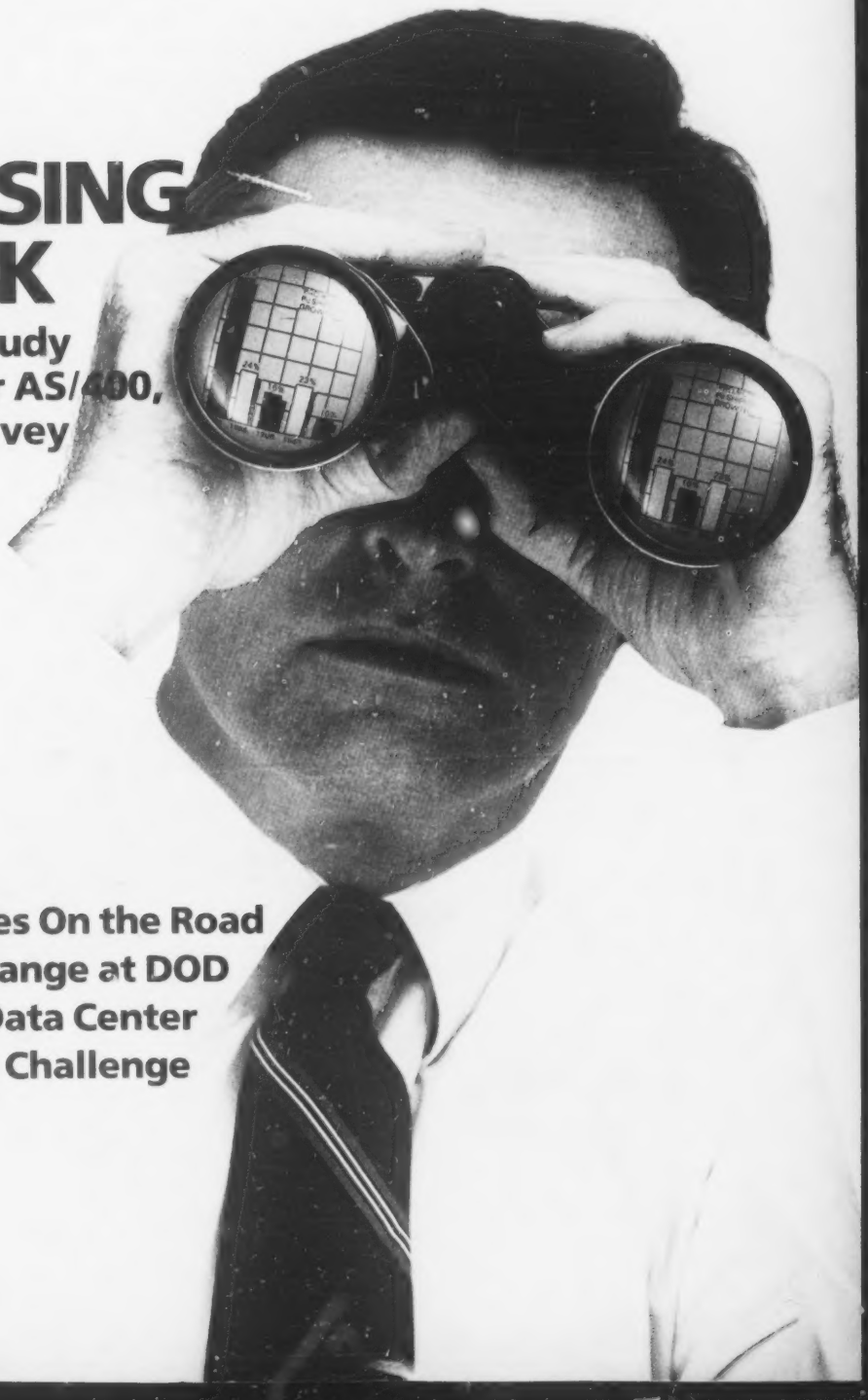
FOR MANAGERS OF INFORMATION TECHNOLOGY WORLDWIDE



THE PURCHASING OUTLOOK

Future Seems Cloudy for PCs, Bright for AS/400, in Mini/Micro Survey

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Portables Get Raves On the Road

Document Interchange at DOD

Shaping Up Your Data Center

Oracle's Olympian Challenge

NOV 15, 1988

VOLUME 34
NUMBER 23

DATAMATION

FOR MANAGERS OF INFORMATION TECHNOLOGY WORLDWIDE

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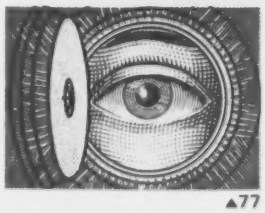

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EDITED BY LINDA RUNYAN The first of a series of special editions reporting on products, services, and methodologies for specific industrial sectors. This issue's *Sectors* is for IS and business unit managers in banks, brokerage firms, insurance companies, real estate firms, and other financial institutions. Later editions will serve managers in manufacturing, government, and the retail/wholesale trade. (Not included in all issues.)

SPECIAL SUPPLEMENT

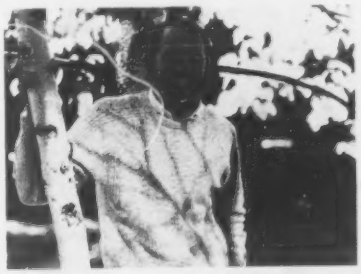
BUDGETS

Industry-by-Industry IS Spending Survey

A DATAMATION REPORT This year, IS's cut has risen to 1.9% of revenues, and the total of the budgets for information systems at the top 120 companies in 12 industries will be $32 billion (see accompanying supplement).

Good Minds Hard at Work

This issue, known annually as our mini/micro report, might be more properly named our Mini/Micro/McWilliams edition. In a period of three weeks, Boston Bureau Manager Gary McWilliams somehow managed to span the West Coast and East Coast for us, interviewing Oracle Corp. executives at their Belmont, Calif., headquarters one week, and sitting through an intense four days of CEO presentations at our annual mini/micro conference in Boston the next. Along the way, he found time to track down several of Oracle's customers and competitors as part of his profile, "Oracle's Olympian Challenge" (p. 31); analyzed a couple hundred pages of survey data from our poll of 5,000 PC, workstation, and minicomputer users before authoring our 1988 Mini/Micro report (p. 18); and touched bases with AT&T, ADP, DEC, and IBM and several of their customers about what they were doing in electronic data interchange for his "Banks, Network Providers Eye EDI," (p. 77).



MARATHON MAN MCWILLIAMS

Whew!

Not that McWilliams' colleagues were resting on their laurels, mind you. San Francisco Bureau Manager Jeff Moad, who's been following IBM's Systems Applications Architecture with the same fervor that Harvard's Ted Levitt approaches marketing issues, discovered that few users and third-party software developers are using CSP despite IBM's promise that applications developed with the language would someday be able to migrate easily among any of IBM's chosen hardware platforms—370 machines, the AS/400, or the PS/2 family. In "CSP: The Weak Link in SAA" (p. 49), one user even told Moad tht CSP was far from being the industrial strength 4GL needed by his organization.

San Jose Bureau Manager Susan Kerr, meanwhile, crossed into Washington Bureau Manager Willie Schatz's territory in pursuit of a communications story on how the Department of Defense was using technology to reduce the amount of paperwork required to do business with DOD. That's right, a cutback at Defense without a politician's whimper! "Document Interchange Reigns at DOD" (p. 81) details the agency's efforts to implement its computer-aided acquisitions and logistics support (CALS) program—must reading for any government contractor or for any other manufacturer trying to streamline its communications with key suppliers. Schatz, by the way, was on a three-week pass from government duty, spending his time preparing a status report on computer-integrated manufacturing, the subject of an upcoming cover story.

Two additional stories that merit your attention came from external resources. Mark Halper, a well-known journalist in electronics circles lapped up all the information he could find on laptops, finding that the mighty midgets are remaking the sales and accounting professions in "Portables Get Raves on the Road" (p. 55). And Jan Rypdal, managing director of FD Software in Norway, cleared up what's going on in the CICS domain in "What's Ahead for IBM On-Line Systems," (p. 69).

Tim Mead

Tim Mead, Editor-in-Chief

Photograph by Julie Houck

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DATAMATION (ISSN 0011-6963) Magazine is issuedtwice monthly on the 1st and 15th of every month by TheCahners Publishing Company, A Division of Reed PublishingUSA, 275 Washington St., Newton, MA 02158-1630. William M. Platt, Chief Executive Officer; Terrence M. McDermott, President; Frank J. Sibley, Group Vice President; JerryD. Neth, Vice President/Publishing Operations; J.J. Walsh, Financial Vice President/Magazine Division; Thomas J. Dellamaria, Vice President/Production and Manufacturing. Editorial and advertising offices, 249 W. 17th St., New York, NY 10011. Published at Woodstock, IL. Annual subscription rates: U.S. and possessions: $60; Canada: $85; Japan, Australia, New Zealand: $155 air freight; Europe: $135 airfreight, $250 air mail. All other nations: $135 surface, $250 air mail. Reduced rate for U.S. public and school libraries: $40. Single copy: $3 in U.S. Sole agent for subscriptions in Japan is Maruzen Co. Ltd., 3-10 Nihonbashi, 2-Chome, Chuo-ku, Tokyo 103. J. sole agent for all otherforeign subscriptions is J.B. Tratsart Ltd., 154 A Greenford Rd., Harrow, Middlesex HA1 3QT, England, (01) 422-8295 or 422-2456. No subscription agency is authorized by us tosolicit or take orders for subscriptions. Circulation recordsare maintained at 44 Cook Street, Denver, CO 80206. Phone (303) 388-4511. Second-class postage paid at Denver, CO 80206 and at additional mailing office.
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THE PURCHASING OUTLOOK

The new Datamation/Cowen & Co. 1988/89 Mini-Micro survey reveals a cloudy horizon for PCs; but IBM's new AS/400 will bolster the prospects for minicomputers overall.

BY GARY McWILLIAMS

For the past seven years, the one certainty in the DATAMATION/Cowen & Co. annual survey of mini/microcomputer purchase plans was the yearly double-digit growth in PC spending and shipments. No more. PC purchases are falling, knocked off course by the crosswinds of operating system and applications software changes and the rising demand for local area networks.

According to an extensive poll of 5,257 DATAMATION readers conducted in July and August, PC unit shipments will fall by 5%, the first decline recorded since readers began reporting their purchase plans in the late '70s. The decline compares with a 21% unit shipment growth projected in 1987. In dollars, a modest 10% growth rate is forecast, down from 23% forecast by survey respondents in the prior year.

In some ways, the PC now appears to have as many gray hairs as the minicomputer. The abundance of new PC users that was once seen entering the survey population is no longer. In fact, the rate of first-ever PC installations among this year's survey group equals that of the mature minicomputer arena.

The relatively slow transition to more powerful PCs and software suggests another reason for the slowdown in buying intentions. Respondents' purchases of 32-bit IBM PS/2 models, although growing, make up less than a fifth of the coming year's total PS/2 acquisitions. By far, the mainstay PC applications also continue to be those packages that first rallied around the original IBM PC. That old faithful, word processing, remains the most widely used PC application. Taken together, the two factors may suggest that the new generation of software to take advantage of the 32-bit technology has not yet emerged. Two current examples are the delays in Lotus's 1-2-3, release 3, and Ashton-Tate's dBase IV.

As this year's survey results illustrate, new gains for both the PC and minicomputer may now depend largely on replacement plans. The driving force in that regard is IBM's AS/400. Announced just prior to this year's survey, the AS/400 has rocketed to the lead spot in respondents' anticipated minicomputer purchases both in unit volume and dollar value. And the effect on the overall minicomputer market has been telling. Respondent purchases promise to send overall minicomputer buys up 15.3% in dollars for the 12 months ending June 1989—topping last year's projected 14.4% increase among the survey population.

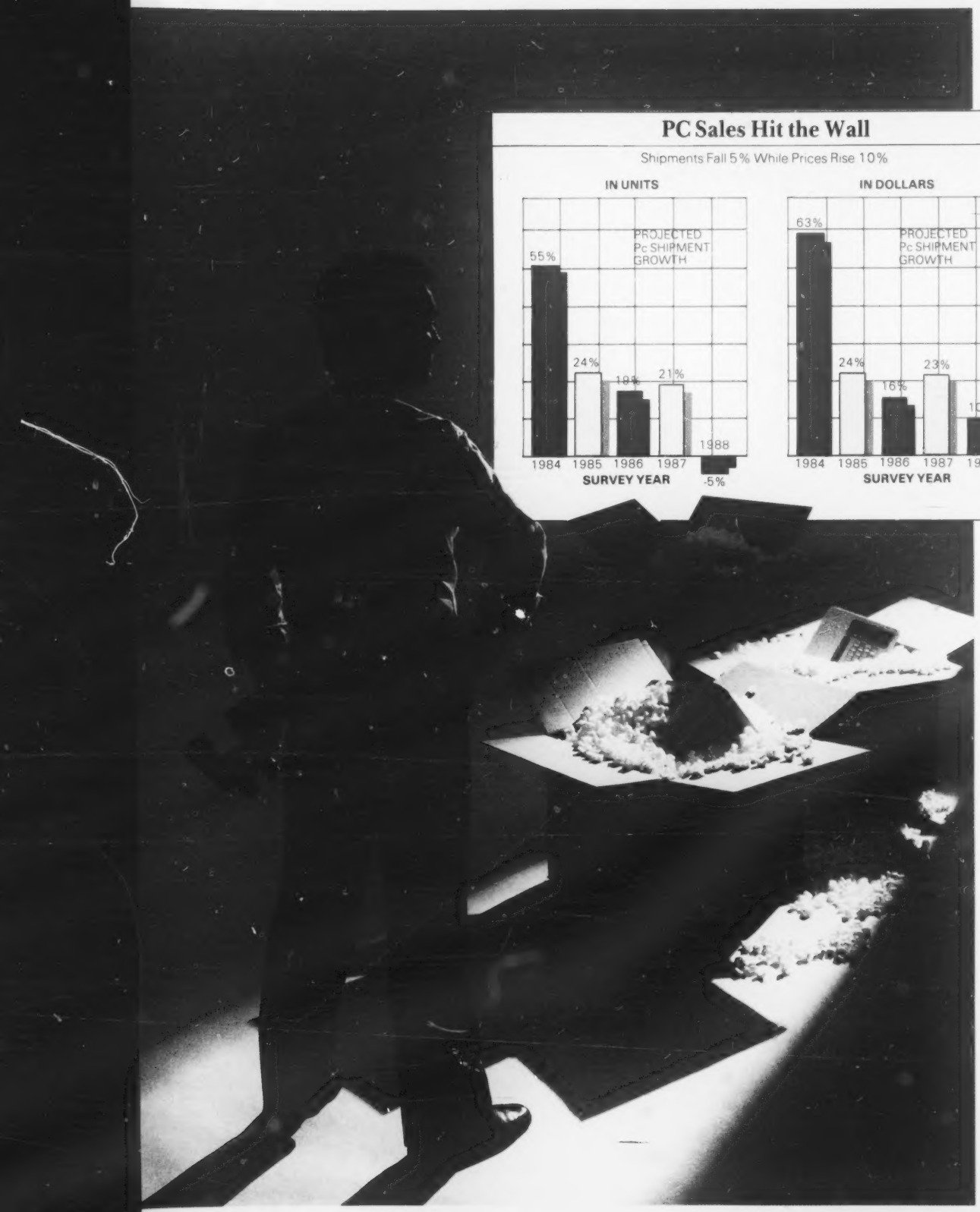
Minicomputer shipment revenues, however, will rise only 8.5% when AS/400 purchases are normalized to last year's Systems/3X revenue level. In that light, minicomputer growth overall continues at the single-digit level first set in the 1986 survey.

Again this year, new applications are twice as likely to be hosted on PCs and workstations for both office/MIS and scientific/engineering/factory applications. The shift away from minis in the office has leveled off, suggesting that for at least this year IBM's AS/400 and Digital Equipment Corp.'s MicroVAX have stemmed further PC/workstation inroads there. In the technical arena, workstations are still taking new applications away from minis.

> One reason for the slowdown could be that new software to take advantage of more advanced PCs is not yet available.

The strong showing by the AS/400 promises to overshadow DEC's midrange gains. Even though in the last 18 months IBM garnered about 21% to Digital's 37% of minicomputer purchase dollars, IBM pulls abreast of DEC in new purchase plans. Each looks to gather about a third of the $860 million respondents plan to spend on minis in the 12 months ending July 1989. For DEC, a revitalized IBM and lingering problems with its resellers suggest the bloom may be off the rose in Maynard.

Neither DEC nor other minicomputer makers, however, appear to be in mortal danger from IBM's rising stature and the favorable reaction to the AS/400. Perhaps not surprisingly, purchases of the new IBM mini are confined largely to existing IBM System/36 and 38 users. Among IBM mini rivals, only NCR users report sizable interest in evaluating the new line. The new



PC Sales Hit the Wall

Shipments Fall 5% While Prices Rise 10%

Source: DATAMATION/ Cowen & Co

Photograph by Walter Wick

mini's impact is likely to be on used Systems/3X prices. Over 65% of Systems/3X users aiming to acquire AS/400s plan to sell their existing systems in the used market.

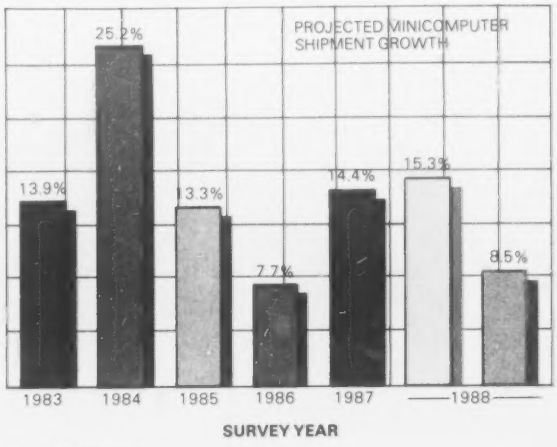
Those hoping to fund part of their AS/400 purchase by selling their existing systems could be in for a surprise. Just as plummeting 308X mainframe prices three years ago slowed IBM 3090 sales, so too could the potential glut of used equipment derail some planned AS/400 purchases. The largest share of AS/400 purchase plans occur among respondents at companies with annual revenues in the $11 million to $250 million range. In contrast, those at companies with less than $10 million in annual revenues—a group targeted by IBM for the new midrange line—are less interested. Only 6.3% of respondents at these small businesses say they will respond to IBM's AS/400 entreaties.

Despite the power IBM is showing in the midrange, Big Blue is not without its soft spots. The most prominent is in PCs. IBM continues to lose ground to clone makers in users' upcoming personal computer purchase plans. Among respondent sites, those planning to buy IBM PCs declines to 37%, the third consecutive year the number of sites favoring IBM has declined. Moreover, OS/2 is less accepted as a future standard among PC and compatible users than the key SAA operating system was a year ago. Plans to standardize on OS/2 slipped to 21% of IBM and compatible PC users from nearly 25% a year ago.

Survey respondents' subdued regard for the use of Unix on PCs makes the oft-mentioned contest between Unix and OS/2 unlikely anytime soon. The battle lines for this group are better drawn around OS/2 and Microsoft Corp.'s DOS operating system. DOS again this year is named by two thirds of respondents as their future PC operating system standard. Only

AS/400 Drives Mini Growth

IBM's Midrange System Accounts for Half of Industry's 15% Growth



Source: DATAMATION/Cowen & Co.

A Surge for IBM Across the Board

The AS/400 is the most dramatic evidence of a revitalized IBM in the eyes of this year's survey group. In four key categories—office systems, software availability, networks, and purchases by oems/systems house—IBM receives either a larger share of purchases or better grades than a year ago.

Based on these and the results of a spring polling of DATAMATION readers at mainframe sites, IBM appears poised to recapture the momentum lost in recent years to midrange and mainframe rivals Digital Equipment Corp. and Amdahl Corp. (see "The 1988 Large-Scale Systems Survey," May 15, p. 88).

The biggest boost for IBM has come from the AS/400 minicomputer and MVS/ESA mainframe operating system. Only in PCs, where OS/2 so far lacks the punch to help its PC fight, does IBM fail to stand toe-to-toe with the competition, according to survey data. Moreover, Big Blue's improved favorability ratings could also stem from the product and organizational changes that reflect a concerted effort to include users in its product deliberations.

Examples of this renewed approval from minicomputer users abound. For instance, after Stratus Computer Inc., IBM gathers the second largest improvement rating by users. Again, after Stratus, IBM users are this year least likely to consider a switch to another vendor, according to respondent rankings.

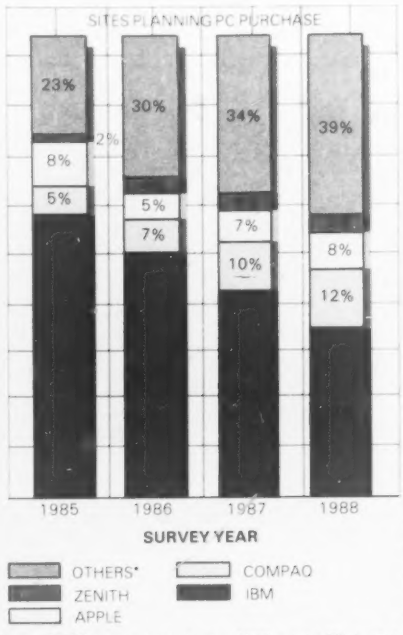
Among oems and systems house customers, only 5.4% this year say they are considering dropping or will drop IBM as their primary vendor. Three years ago, nearly 19% considered such a switch. In the competition for oem and systems houses, IBM shows up significantly more often than it did three years ago, and emerged as the runner-up nearly 17% of time this year in oem/systems house vendor selections. That's an improvement of more than 60% from the second place mentions it received in 1986.

IBM can also boast new gains in minicomputer software availability and quality. A spin-off benefit from the AS/400, which consolidates System/36 and System/38 operating environments, is that Big Blue is no longer plagued by the perception that its software is weak, according to the survey. This year, it is a close number two to perennial leader Digital Equipment Corp. in minicomputer software availability and quality.

But IBM does have some weaknesses to address, particularly in its support. Among mainframe survey respondents, service and support ratings fall well behind its product army. In the midrange, software support continues to be the largest source of dissatisfaction among users planning a switch to another vendor. Even here though, IBM has improved consistently in the past three years. The percentage of sites that mentioned software support among their reasons for considering a change this year has dropped by half from 1986.

IBM Loses PC Ground

Compaq, Apple and Pc Clones Gain On IBM

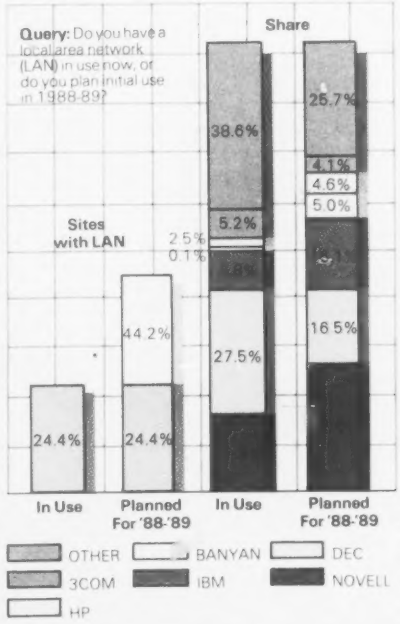


*Mainly IBM PC clones, but specifically in 1988 includes PC's Limited 3.0%, HP 2.1%, AT&T 1.4%, Unisys 1.4%, Leading Edge 1.2%, Tandy 1.0%, Wang 1.0%, etc.

Source: DATAMATION, Cowen & Co.

Network Demand Is High

Novell, IBM, and Banyan Capture LAN Share



*Implies 44% compound growth rate 7/88-12/89

Source: DATAMATION, Cowen & Co.

The DATAMATION Dozen

The Roster of the hottest minicomputers, past and future, shows some machines maintaining their clout, others sliding into oblivion.

The past	The future
IBM System/36	IBM AS/400, Unspecified
DEC MicroVAX II	DEC MicroVAX, Unspecified
DEC MicroVAX, Unspecified	DEC MicroVAX II
IBM System/38	DEC VAX, Unspecified
IBM PS/2- Model 80	IBM System/36
DEC VAX 8500/8530	HP 3000 Series, Unspecified
HP 3000 Series, Unspecified	IBM 9370, Unspecified
IBM 9370, Unspecified	IBM PS/2- Model 70
DEC VAX, Unspecified	HP Spectrum, 3000 950
AT&T 3B2	DEC MicroVAX 2000
Compaq 386, Unspecified	IBM RT PC
HP 3000 Model 70	DEC VAX 6210

*including workstations

among IBM users, where DOS still prevails with 55.8% of mentions, is OS/2 gaining any ground. The newer PC operating system is preferred by 39% of IBM users, a slight gain from a year ago.

According to the survey, those respondents selecting OS/2 and its extended edition version are more likely to work at larger corporations. So, while IBM is losing market share among respondent sites overall, there is evidence to show that the giant's hold on those larger-volume PC buyers isn't slipping as much as might be assumed. For example, IBM's share of expected unit purchases among survey respondents has, at 39%, changed little. Unit share is declining but not as much as the growing number of sites not purchasing IBM PCs. In all, respondents plan to purchase 124,780 PCs through June 1989, down from 150,435 units between July 1987 and June 1988.

One reason for the difference may lie with PC purchases made directly from the manufacturer. While the propensity to use retail stores for PC purchases is accelerating, the volume that's moving via retail is not increasing equivalently. Hardware purchases made direct from the manufacturer account for half or better of all respondents' unit purchases, a ratio that has held since at least 1985.

PS/2 Hasn't Stemmed Defections from IBM

Given IBM's market share problems, the company's actions in the past year to accelerate PS/2 unveilings have not proved adequate to stem the defections. The model for the PC industry continues to be Compaq Computer Corp., Houston, which has rapidly boosted its Intel 80386-based offerings. Within the survey group, 80386 units make up nearly 40% of Compaqs to be purchased in coming months. The number could well be substantially higher because a sizable portion of respondents did not specify the individual models to be purchased.

Apple Computer Inc.'s share of installed PCs among respondents was flat in the last survey period. Despite the overall PC decline, Apple eke out a slight increase among purchases through 1989. The latest

Charts by Catherine Francis

survey also shows that Apple users rate the software quality and availability for their systems on a par with IBM and compatible users' ratings.

Local area networks (LANs), integrated office systems, relational databases, and on-line transaction processing similarly rank as high-priority items in this year's survey. But where workstations and PCs have been far and away the beneficiaries of the move away from the minicomputer, this year's projected PC shipment decline suggests that there are alternative scenarios.

For instance, the percentage of sites initially installing LANs is rising sharply. Where about 25% of respondent sites reported use of a LAN this year, that is expected to grow to a projected 44% by June 1989. Moreover, the number of PCs attached to networks is approaching a quarter of all PCs installed, according to survey results. Respondents reported that some 23.6% of their installed PCs are linked via networks—a substantial increase from last year's 18.3%.

The interest in networking PCs is reflected by the vendors that respondents favor for new LAN purchases. The four leaders are Novell Inc. (Provo, Utah), DEC, IBM, and Banyan Systems Inc., Westboro, Mass. Novell looks to edge out DEC, which holds 27.5% of the survey group's existing LAN installations, for the number one position this year in terms of planned installations. Novell's recent unveiling of minicomputer versions of its NetWare network operating software have enhanced its already strong PC networking reputation.

The growth patterns established a year ago for database and integrated office systems software continues in the latest survey. Last year's database growth leader, Oracle Corp., again leads the independent DBMS software vendors with an estimated 22% of planned purchases this year. IBM, which provided office software on a test basis with initial AS/400 sales, also gains significant market share in office systems and databases. A relational database is incorporated into the AS/400 OS.

For DEC overall, the signs are mixed. The company continues to gain new office systems and network installations but loses market share in each, according to survey results. And while its favorability rating increases among its own users, DEC takes a sudden turn for the worse in another important indicator of customer loyalty. After three consecutive years of improved favorability ratings, its ranking for customer loyalty this year is now only slightly better than the industry average. Among OEMs and systems houses, where dissatisfaction over discount policies lingers, a

Some Hot 386s

Specific 386 machines purchased/planned

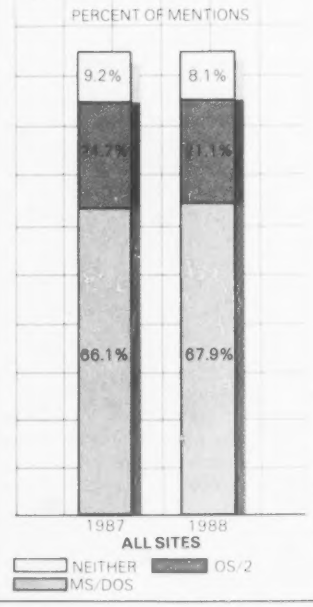
Machine	Purchases 1/87-6/88 Units	Purchases 1/87-6/88 Sites	Expected Purchases 7/88-12/89 Units	Expected Purchases 7/88-12/89 Sites
Compaq				
Deskpro 386	781	175	978	144
Deskpro 386-20	156	48	164	23
Deskpro 386-25	6	4	62	15
IBM				
PS/2-70	69	22	1,461	79
PS/2-80	831	154	1,600	134
PC's Limited (Dell)				
366 16	73	14	120	19
Wyse				
PC 386	54	20	84	12
Zenith				
Z-386	73	20	288	19

Source: DATAMATION/Cowen & Co.

DOS Stronger Than Ever

Only Two out of 10 Users Plan To Switch to OS/2

Query: For IBM and PC clone users: specifically, which OS do you expect to standardize on for future pc purchases?



Source: DATAMATION/Cowen & Co.

Survey Methodology

Results of the 12th annual DATAMATION/Cowen & Co. mini/micro computer survey are culled from the responses of DATAMATION readers throughout the United States. The respondent audience is selected based on their acknowledged purchase or use of minicomputers, small business systems, or microcomputers.

Cowen & Co., a Boston brokerage firm that has directed the survey since 1976, mailed 55,000 questionnaires beginning the week of July 11, 1988. Those questionnaires were directed to no more than three individuals at a single site; final selection of recipients was based on the subscriber's title. The qualified and unduplicated replies that were received totaled 5,257—a return of 9.7%. Results were presented to Cowen's institutional investor clients on Sept. 26.

For the purposes of the survey, the definition of minicomputers covers a broad category of systems, including 16-bit to 32-bit processors (such as the Digital Equipment Corp. PDP-11, MicroVAX, and VAX 8XXX and comparable systems from IBM, Data General Corp., Hewlett-Packard Co., Tandem Computers Inc., and others); minisupercomputers; departmental and small business systems; office systems; network servers; and workstations. The latter are defined as single- or multi-user systems priced generally in excess of $5,000 per station. Personal computers are single-user, desktop, or portable systems priced in general below $5,000 and include the IBM PC and PS/2 models 25-60, Compaq, and Apple II and Macintosh, among others.

This year's projected 5% decline in PC unit shipments and the related 10% dollar value increase are calculated including purchases of IBM PS/2 models 60 and 70 and comparable Intel 80386-based systems. Those computers, in all other instances, are counted as workstations. To order the complete survey results, please call Laraine Donisi at (212) 463-6893.

third now say they expect or are seriously considering dropping DEC as their primary mini supplier.

DEC's proprietary architecture was the second-highest cause of dissatisfaction cited by those DEC users contemplating a switch to another vendor. Complaints about DEC's software support—the leading source of complaints against most other mini vendors—have dropped sharply, however. DEC's post-survey release of a RISC architecture workstation should quell some of the price and architecture discontent. The survey definition of a minicomputer includes workstations (see "Survey Methodology").

Strong Interest in DEC's OLTP Systems

DECtp, the company's freshly released complement of transaction processing products, should produce a substantial boost to the company's OLTP market share, according to survey respondents. For those sites planning new OLTP installations, DEC captures 22.4% of planned installations, second only to IBM's 42.2%. It rates a weak 5.8% market share of currently installed OLTP systems at respondent sites.

In the wake of DEC's entry into the OLTP market, the implications for Tandem Computers Inc. and Stratus Computer Inc. are not uniformly good. Interest in the fault tolerant capabilities the two provide is highest among those planning new OLTP systems. A fifth of respondents planning new OLTP installations say they are willing to pay for fault tolerant capabilities. Tandem and Stratus also record the highest favorability ratings of any vendor.

DEC's RISC/Unix workstation entry may have the same impact in coming months. Respondents to the survey already list Sun Microsystems Inc. and Apollo Computer Inc., the two biggest workstation makers, as offering the largest off-list pricing. DEC's discount practices have not strayed far from the industry average in recent years but could change as a result of its RISC unveiling.

The new Unix-based workstation cuts both ways: it frees DEC to price more aggressively against Sun and Apollo, and potentially less so in its proprietary MicroVAX line. In fact, while the MicroVAX family is increasingly favored for new applications, respondents' planned purchases will represent a smaller percentage of VAX outlays than a year ago.

Among all mini vendors, Unix operating systems continue to make slight inroads among commercial users and steady gains in the technical arena. Overall, one fifth of respondents say they are likely to employ Unix for future applications work. Excluding IBM sites, where Unix is not supported on the AS/400, those likely to employ Unix is one quarter of the total.

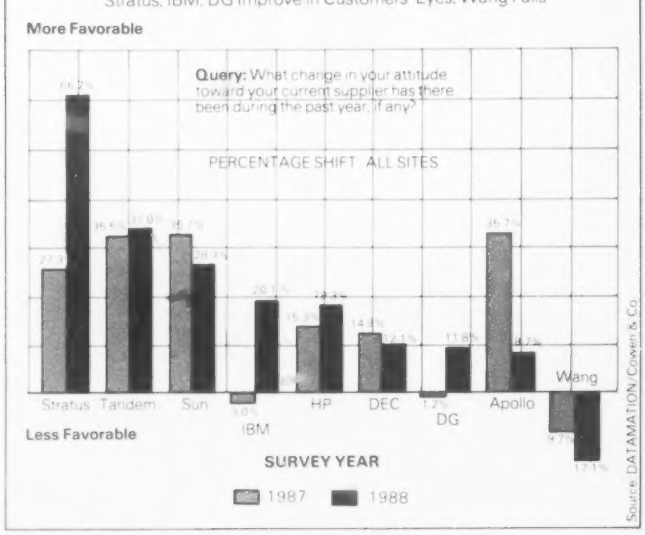
The Issue of Proprietary Architectures

The traditional minicomputer vendors, for whom Unix typically is an added thrust, suffer the brunt of the minicomputer decline again this year. Falling market shares for Data General Corp., Prime Computer Inc., Tandem, and Wang Laboratories Inc. show up in respondents' planned minicomputer purchases, according to survey results. Importantly, proprietary architecture ranks as a significant issue among those considering a switch. Hewlett-Packard Co., whose Unix-based HP 3000 8XX minicomputers make up an ever-increasing portion of its sales, and Sun Microsystems again gain share of respondents' planned purchases. This year, Unisys will increase its market share through a pair of large government procurements for Unix-based systems.

One of the mini makers whose perception among users fell sharply in past years has made significant progress in redeeming itself. Among this year's survey respondents, Data General garners the first positive favorability ratings among both OEMs and end users in three years.

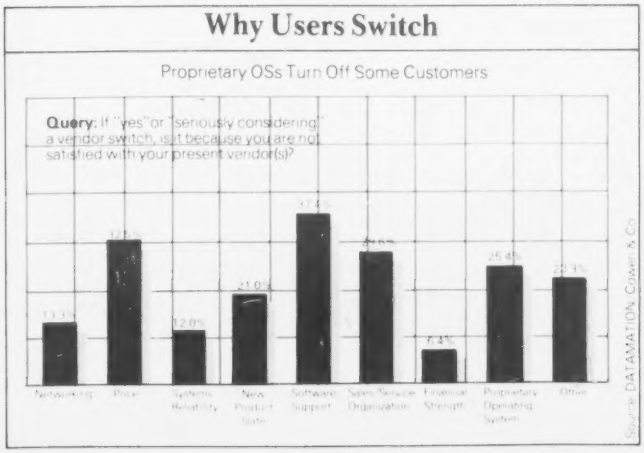
Attitudes Shift

Stratus, IBM, DG Improve in Customers' Eyes; Wang Falls



Why Users Switch

Proprietary OSs Turn Off Some Customers



Portables Get Raves On The Road

Portable computer sales are soaring. More than a million will be shipped in 1988. Meanwhile, the mighty midgets are remaking the sales and accounting businesses, and work is following executives to their homes and hideaways.

BY MARK HALPER

Nearly one million portables—from laptops to luggables—will be shipped in 1988, according to International Data Corp. The Framingham, Mass.-based company says this is up from last year's 740,000, and more than double 1986's 411,000. Moreover, applications for such itinerate circuitry seem unbounded, and include the tracking of corn niblets, multiple vitamins, frozen fish, dead moose, gasoline supplies and prices, corporate profit and loss statements, and Alka Seltzer.

The two broad categories of use are sales force automation—which gives on-the-road muffler and Twinkie salespeople access to inventory, price, and customer information stored on a distant mainframe—and off-site auditing and accounting. In the latter group, for instance, the Internal Revenue Service has armed its examiners with 18,000 Zenith laptops.

For sales automation, laptops are particularly popular with traveling consumer goods salespeople, who traditionally have hauled volumes of loose-leaf binders and spiral notebooks to keep them abreast of vital statistics. Laptops not only lighten their travel load, they offer them up-to-the-mainframe-minute information while they're out in the field.

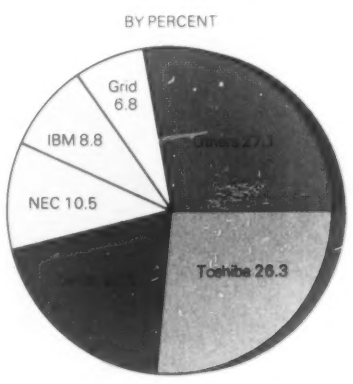
"Many of our users are account executives who are on the road all the time and work out of their homes," notes Terry L. Marksberry, who is director of management systems for Pillsbury Co., Minneapolis. Pillsbury's consumer food operation is issuing Zenith Supersport 286 laptop computers to help salespeople stock supermarkets with flour, cake and cookie mixes, frozen foods, and canned vegetables. About half of the 300 computers are in use, says Marksberry, and the other half will be distributed by the end of next year.

The company is setting up X.25 transmission to tie the laptops into a Novell Ethernet local area network in Minneapolis, which in turn is connected via 3270 gateways to an IBM 3090 mainframe, Marksberry says. The system will allow the user to download customer and product information from the 3090, and, using a Higgins Administrative System program resident in the LAN, to communicate via electronic mail with other portable and desktop computers.

Illustration by Cathy Saska

Who Shipped IBM-Compatible Portables in 1987

"Other" manufacturers dominated U.S. shipments of IBM-compatible portables.



Source: International Data Corp., Framingham, Mass.

Miles Laboratories' consumer health care division has, for the last 10 months, equipped about 25 sales executives in Chicago, New York, and Philadelphia with NEC laptop computers. It plans eventually to have 100 units in circulation to help it sell multiple vitamins and Alka Seltzer to drug store chains, mass merchandisers, food stores, and other outlets. The division is also serving as a test for other Miles divisions. "We wanted to put technology out there to provide our salespeople with better information," notes Fred Randazzo, manager of sales training.

The company started with the 720KB dual-floppy Multi Speed model, and switched to the 20MB hard disk version out of speed and capacity concerns, Randazzo says. Sales officials use a sales communication program, developed by the company's MIS department to include electronic mail, a customer file, a sales progress report, order status information, and a form for reporting the salesperson's assessment of a sales call. Data are called down from an IBM 3081 mainframe and routed through a DEC MicroVAX II. Spreadsheet and word processing programs are also loaded. Software occupies a little over 2MB of the 20MB hard disk, says Randazzo.

Portables are also playing a key role for companies that are selling information and that need to showcase their databases and downloading capabilities to potential customers.

Dun & Bradstreet Credit Services, Murray Hill, N.J., or example, has supplied its sales and sales support staff with some 200 Compaq portables. In 1985, it introduced the 8086-based model, and has purchased each of the subsequent 80286 and 80386 units, according to Ernie Harris, vp of electronic delivery systems.

The machines are used to persuade customers to buy telecommunications software from D&B that would allow them on-line and on-board access to the constantly updated D&B database, which resides on an IBM 3090 mainframe.

D&B salespeople also use the Compaq to demonstrate disk-based company profiles with bimonthly updates, and a CD-ROM version of D&B's business reference directory, which in hard copy "is about as big as four New York City phone books," Harris says.

Machine configurations vary and depend to some extent on when they were bought. They are generally equipped with hard disk drives, either 10MB or 20MB, a disk drive ranging from 360KB to 1.2MB, and a 1,200-baud Hayes or Hayes-compatible modem. The 3090 links are made in tty mode.

Compaq is also the brand of choice for auditing and accounting giant Price Waterhouse, which uses an estimated 2,500 units to download information to its nomadic number crunchers at offsite locations.

"Much of the work time is spent at the client's site, and we move frequently from one to another," notes Don Smith, a Chicago partner, and chairman of the company's steering committee on microcomputer use. "We can spend as little as a couple of hours at some jobs. At others, like Exxon or Mobile, we're there year-round."

A typical configuration at a client's site is 640KB of RAM and a 20MB hard disk drive. About 5MB of the 20MB are occupied by internally developed and loaded programs such as tax and audit forms and formulas, financial schedules, and memo writing, he says.

"Downloading can be a substantial problem because of the lack of uniformity in the infinite variety of minis and mainframes our clients use," Smith notes. The company asks clients to copy needed files onto magnetic tape, which Price Waterhouse then processes through a reader in Chicago for downloading to the appropriate Compaq computer. The procedure, continues Smith, also helps address security concerns among clients who are able to deliver pertinent files without opening entire databases.

The company has been buying Compaqs since 1982 and, like D&B, buys new models as they come out. As more powerful machines are brought in, older models are kept for word processsing and other "lower utilization" functions. Smith says Price Waterhouse has also retrofitted many of its earlier Compaqs with memory expansion boards and microprocessor accelerators.

While laptops and luggables raise the standard of efficiency for salespeople and auditors they may also spell bad news for some workers, like middle managers looking forward to next month's resort area seminar as an escape from office rigors.

With the communications capabilities of most portable units, executives on the road can—and are expected to—send and receive mail, file memos, and tend to other tasks that previously required on-site presence. "It used to be if a guy went to a conference for a week, the office would say, 'Oh, Fred's out until Monday.' Laptops have changed the way people do business," asserts Chris Broome, senior technical consultant for Arco Products Co., Los Angeles, the oil refining marketing segment of Atlantic Richfield Co.

About 60 Arco officials, described by

Laptops, Transportables in the U.S., Past & Future

Laptop and portable computer sales are being driven by the automation of sales forces and accountancies.

	1985	1986	1987	1988
IBM compatibles	80,000	140,000	400,000	600,000
Growth rate (%)		75.0	186.0	50.0
Other portables	72,000	120,000	218,000	190,000
Growth rate (%)		66.7	81.7	-12.8
Subtotal portables	152,000	260,000	618,000	790,000
Transportable pcs	245,175	151,600	122,000	148,000
Growth rate (%)		-38.2	-19.5	21.3
Total: portables & transportables	397,175	411,600	740,000	938,000
All business pcs	2,690,000	3,402,000	5,227,000	6,300,000
% portable & transportable	14.8	12.1	14.2	14.9

Source: International Data Corp., Framingham, Mass.

Charity Catherine Fiorito

A Compendium of Top Portable Computing Vendors

Blue Chip Electronics
7305 W. Boston St.
Chandler, AZ 85226
(602) 961-1485
Master PC Portable
Circle **150**

Compaq Computer Corp.
20555 FM 149
Houston, TX 77070
(713) 370-0670
Compaq Portable II; III; and 386 luggables
Circle **151**

CTXT Systems Inc.
9205 Alabama Ave.
Chatsworth, CA 91311
(818) 341-4227
LTP-7 luggable
Circle **152**

Data General Corp.
4400 Computer Dr.
Westboro, MA 01580
(617) 366-8911
DG One/Model 2T laptop
Circle **153**

Datavue
One Meca Way
Norcross, GA 30093
(404) 564-5555
Snap 1 + 1 and Spark laptops; DV25 luggable
Circle **154**

Dynamac Computer
14001 E. Iliff Ave., Suite 410
Aurora, CO 80014
(303) 695-7780
Dynamac SE laptop
Circle **155**

Epson America Inc.
2780 Lomita Blvd.
Torrance, CA 90505
(800) 421-5426
Equity LT laptop; HX 20; and HX 40 laptops
Circle **156**

Hewlett-Packard Co.
Customer Information Center
19310 Pruneridge Ave.
Cupertino, CA 95014
(800) 752-0900
Portable Plus and Portable Vectra CS luggables; will soon offer custom version of Zenith SupersPort laptop
Circle **157**

IBM
155 Chestnut Ridge Rd.
Montvale, NJ 07645
(201) 930-5000
PC Convertible laptop
Circle **158**

International Systems Marketing
943A Russell Ave.
Gaithersburg, MD 20879
(301) 670-1813
Express-286 and Express-386 luggables
Circle **159**

Jonos International Corp.
930 South Placentia Ave., Suite A
Placentia, CA 92670
(714) 630-2771
C2100 luggable
Circle 160

Kaypro Corp.
533 Stevens Ave.
Solana Beach, CA 92075
(800) 542-9776
2000+ and 2020 laptops
Circle **161**

Micro Express
2114 South Grand Ave.
Santa Ana, CA 92705
(800) 642-7621
The Roadrunner luggable
Circle **162**

Mini-Micro Business Systems
P.O. Box 13063
Boulder, CO 80308
(303) 444-3746
Models 286 and 386 luggables; resells ExecuMate laptops made by U.S. Micro Engineering
Circle **163**

Mitsubishi Electronics America Inc.
991 Knox St.
Torrance, CA 90502
(213) 515-3993
Big Screen Desktop/Laptop laptop
Circle **164**

NEC Home Electronics
1255 Michael Dr.
Wood Dale, IL 60101
(312) 860-9500
Multispeed HD and EL laptops
Circle **165**

Ogivar Technologies
7200 Trans Canada Hwy.
St. Laurent, Quebec
H4T 1A3, Canada
(800) 361-3694
286 Laptop
Circle 166

Sharp Electronics Corp.
Systems Div.
Sharp Plaza
Mahwah, NJ 07403
(201) 529-8200
Models 4600 and 5541 laptops
Circle **167**

Tandy Corp.
1700 One Tandy Center
Fort Worth, TX 76102
(817) 390-3700
Models 1400 and 100 laptops. Also owns Grid Systems Corp., which offers Series 1500 laptops; GridLite Plus laptop; GridCase EXP laptop; GridCase Tempest (for military use). Phone: (800) 200-GRID
Circle **168**

Toshiba America Inc.
9740 Irvine Blvd.
Irvine, CA 92718
(714) 583-3000
T5100, T3200, T3100 series; T1200, T1000
Circle **169**

Trans PC System Inc.
11849 E. Firestone Blvd.
Norwalk, CA 90650
(213) 868-6930
LT laptops; LC luggable series, crt luggable; GP luggable
Circle **170**

U.S. Micro Engineering
P.O. Box 17728
Boulder, CO 80308
(303) 529-8200
Models 286 and 386 ExecuMate laptops
Circle **171**

Zenith Data Systems
1000 Milwaukee Ave.
Glenview, IL 60025
(312) 391-7000
SupersPort 286 laptop
Circle **172**

Broome as "normal office workers," use Toshiba 1100, 1200, and 3100 laptop computers "to do work while they're away on business trips," typically using 1MB of on-board RAM and a 20MB hard disk drive.

Broome says the most common use for these laptops is dialing IBM's PROFS office automation software, which resides on a host 3090 at Arco's Los Angeles headquarters. PROFS connectivity permits portable users to transmit electronic mail, check their calendars and those of others in the system, and schedule meetings. Among other tasks, PROFS also allows users to send documents to printers at other sites provided they are on the same IBM SNA network.

Meanwhile, north of the border, it was a seemingly eager bunch of workers that prompted the city of Montreal to purchase 20 Ogivar 80286-based laptop computers, each equipped with 20MB hard disk, 720KB floppy disk, and 1MB of on-board RAM. "Our [desktop] users mentioned that if they had portable PCs, they could do more work at home," says IS director Claude Couture.

The city bought the machines from Montreal-based Ogivar in June, loaded them with Wordperfect, Lotus 1-2-3, DBase III, and DataEase, and distributed them throughout 20 departments. It will equip them with mainframe connectivity after it "installs a good security system with multiple level passwords," Couture says. Desktop-to-mainframe connections

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are made via dedicated lines. "The central data include city land use plans. If somebody was able to figure out how to get hold of it, it could generate land speculation and this sort of thing," Couture notes.

Another governmental agency in Canada, the Ontario Ministry of Natural Resources, is using a Compaq Model II for both tracking and increasing its moose population, according to John Barbowski, information data systems coordinator.

One problem even more endemic with portables than with desktop computers is theft. It's not difficult to slip off with a 10-

□ LAPTOPS ALLOW EXECUTIVES TO DO THINGS THAT PREVIOUSLY REQUIRED ON-SITE PRESENCE.

inch by 12-inch by 2-inch piece of plastic. Sohio Oil Co., the Cleveland-based gasoline retail arm of BP America, has taken a precautionary measure by preventing some 1,400 Tandy model 100 and 102 laptops from printing or running anything but proprietary programs downloaded into bubble RAM from one of 10 DEC MicroVAX IIs.

The company has issued one 128KB machine to each of its 1,400 service stations in the eastern U.S., for daily reports on sales and competitors' prices, according to Bryant Santini, manager of retail automation. (Sohio runs service stations under its own name as well as Gulf, Boron, Gibbs, and Gas & Co.) The Tandy-to-DEC transmissions are made in two-minute sessions via standard telephone point-to-point communications, although Santini says Sohio is considering establishing leased-line services for stations with long distance connections to a VAX. The regional VAXs route the daily information to either a Prime Computer Inc. or Hewlett-Packard mini in Cleveland.

While Sohio presently loads the programs into bubble memory, it is considering buying new replacement machines equipped with less-expensive static RAM for the same purposes, says Santini. To protect the machines from motor oil and other physical rigors of gas station wear and tear, Sohio shelf-mounts them and covers the keys with plastic. "There are a lot of gorillas out there banging on them," he quips.

Mark Halper is a freelance writer based in New York City.

Top Drug Firms to Digitize Documentation

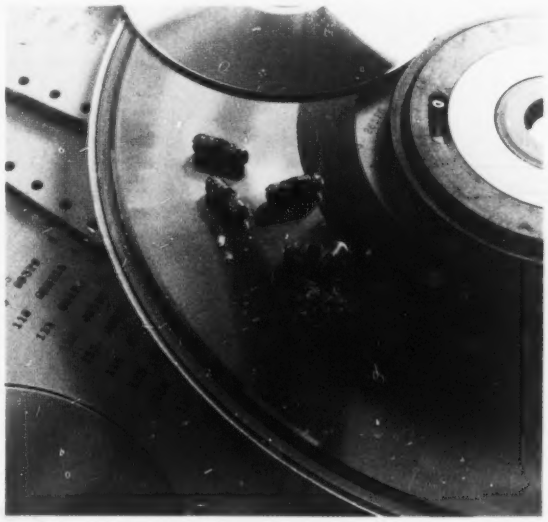
The biggest pharmaceutical firms have recognized the value of digital document processing systems in reducing their R&D cycles and FDA approval time. Could it speed new drugs into the hands of the sick?

BY SCOTT C. McCREADY

Fifteen of the top 25 pharmaceutical companies are poised to spend $23 million dollars over the next 18 to 24 months on the relatively new technology of digital document systems, according to recent research conducted by CAP International Inc., Norwell, Mass.

ICI Pharmaceuticals (Wilmington, Del.), Warner Lambert (Morris Plains, N.J.), Glaxo (Research Triangle Park, N.C.), and Pfizer (New York), have already taken the plunge. While the other 11 firms asked not to be identified for competitive reasons, they will all have optical storage-based document systems by the end of the year, at an average cost of over $1 million. The remaining 10 have committed to spending $17 million over the same period.

There are approximately 156 drug companies in the U.S., many of which are trying to speed the manufacture of new drugs by computerizing the new drug application (NDA) process with standard technologies (see "IS: the Best Medicine for Drug Monitoring," Aug. 1, p. 41).



Photograph by Bob Lorenz

What is it about optical-based document processing systems that is prompting the major pharmaceutical companies to assign it a large portion of their office automation budgets? They have discovered that digitizing document images and processing them electronically offers the greatest potential for shortening the R&D cycle, the time required for Food and Drug Administration (FDA) approval, improving the effectiveness of label design and approval, and minimizing other administration expenses.

"Senior management is finally beginning to wake up. We process documents. That is the essence of this business. Because of the long R&D cycle and the strict regulatory environment, we need every tool available to improve the process and protect the integrity of our files," says a spokesperson for Ciba-Geigy, which is evaluating systems.

"This technology appears to be readily adaptable to the R&D environment," says David H. McCurdy, former ICI director of pharmaceutical research administration and an internal pioneer of its system, now a consultant to the firm. ICI Pharmaceuticals began investigating the use of electronic documentation as far back as 1984 and, after determining its existing costs of managing documentation, became the first pharmaceutical firm to employ optical disk technology with a pilot FileNet Corp. system in January 1986.

A spokesperson for Warner Lambert says, "This is the first technology in perhaps 20 years that will allow us to alter the basis of competition within this industry. Internal efficiencies stand to save us millions of dollars, while the impact on the FDA could amount to hundreds of millions."

Pharmaceutical firms, however, face a particularly cumbersome, paper-intensive process of bringing a new drug to market, a process that can take up to 10 years and $125 million to complete. Their health in the highly competitive industry is related entirely to their ability to innovate continually and bring those innovations to market first. Therefore, any investment in a technology—in this case, optical disk systems—that offers the potential to reduce radically the mountains of paper-based drug research information required by the FDA, while simultaneously offering significant economies for the R&D cycle, is money well spent.

The industry as a whole will spend in excess of $5 billion on R&D this year, but the average product will still take eight years to complete the cycle unless the means for accomplishing the process can be altered radically.

Both phases of the drug approval process, as they are conducted today, present overwhelming document processing problems. During the exhaustive clinical testing required by the FDA of any new drug, pharmaceutical firms have to manage not only internal R&D but a great deal of research that is performed, of neccessity, by organizations outside the firm's control. It is not unusual for a pharmaceutical company to receive 600,000 case report forms per year from outside testing parties. Since these records are the "go or no go" evidence for the FDA to approve the drug, it is imperative that any incomplete case reports or patient records be clarified completely before being shipped to FDA evaluators. Today, clarifying the of-

ten incomplete case reports is done in batches, which usually are too large to be handled by phone and must be mailed back and forth between the pharmaceutical firm and the clinical testing site.

How to speed up the process of clarification? One answer: digitize the incoming documents and electronically route the report form to the appropriate department for review. Should further clarification be needed, those forms can be downloaded overnight to the appropriate testing center. The clarification process can then be conducted by telephone and annotations made to the document in real time. This is no small investment on the part of the pharmaceutical manufacturer, but the potential financial return is relatively easy to discern.

In the second phase of the drug approval process, the FDA requires that each pharmaceutical company deliver the clinical test results to the agency in a strictly regulated format for evaluation by an assortment of physicians and medical experts. The net result is that the pharmaceutical company has to create new documentation that compiles and tabulates the statistical information contained in the case reports. The statistics must be classified to clearly show whether the drug caused any adverse reactions or reacted with other medications, and its overall effectiveness.

Since 1962, NDAs have been submitted on paper as the law requires, commonly delivered by tractor trailer. While the paper method of document presentation has yielded a remarkable level of safety for the U.S. population, the price it exacts is twofold: the great cost, which is eventually passed onto the consumer, and the lengthy approval process.

Using paper slows the process, not only because of the huge volume of documents involved, but also because paper documents do not allow simultaneous access by multiple users. Therefore, should an FDA inspector require a piece of unavailable documentation to continue an evaluation, he or she simply will go on to another NDA. The volume of documentation precludes the FDA from handling multiple copies were they even available.

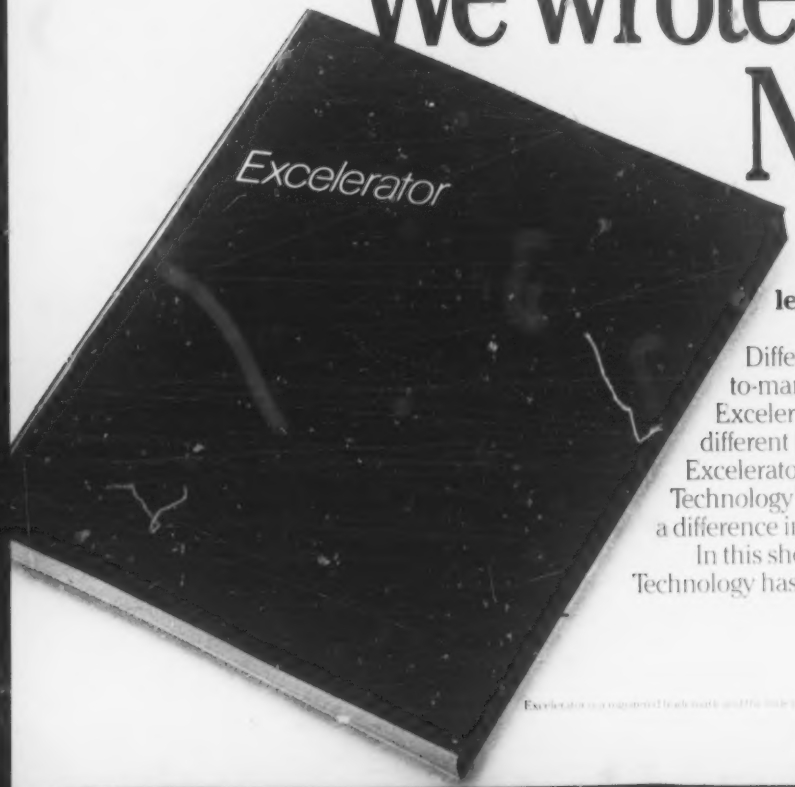
CONSULTANT McCURDY: Began looking at electronic documentation for ICI in 1984.

Furthermore, should an inspector require clarification, the entire process must be conducted by mail to provide a record of the change for legal protection.

The FDA approval process is not likely to improve by streamlining the documentation itself. In fact, though the FDA, for the first time in its history, rewrote the requirements for drug filings over the past

Photograph by Sal D'Marco Blackstar

We wrote the book
Now we've



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three years, the table "New Technology Hasn't Helped Yet" shows this has not shortened the approval cycle.

Submitting NDA documentation via optical storage media is the most obvious solution to ultimately eliminating the paper glut, since one 12-inch optical disk can store approximately 50,000 pages. Unfortunately, until the law that requires NDA documentation on paper is changed, the drug companies will have to back up any optical disk-based NDAs with paper. The FDA has said it intends to change the law, though that could take years.

Using optical storage technology for NDAs would also allow immediate, multiple access to the same document and provide the benefits of on-line indexing techniques. Clarification requests would no longer have to be handled by mail, since sending images over telecommunications lines overnight is reasonably economical—if they are relatively few in number.

"The ability to rapidly introduce [this] technology to large paper-based files has been found to be possible, and integration into a computer-based information system is proven to be practical and readily implemented," says ICI's McCurdy. In June 1988, ICI was the first company to submit an optical NDA to the FDA. That NDA was backed up with paper documentation.

Once a drug has been approved, there is a step that represents another potential application for digital document systems: the design of an appropriate label and directions. To a greater degree than in the consumer products world, pharmaceutical companies have to be concerned about accuracy and safety in labeling.

The design of an appropriate label can become a nightmare of coordination to ensure that everyone is working with the latest version, and get the appropriate level of approval. The process can be streamlined and accelerated by digitizing the original draft and electronically routing it to the right people, along with the appropriate deadlines for changes and final approval. As with many applications for optical document systems, the net economic benefits are usually derived from being able to move the image around the office electronically and enforce discipline on the business system via work flow software.

Marketing & Legal

The introduction of any new technology always raises the issue of which departments should be able to access it and, perhaps, thereby contribute unforeseen benefits to the entire organization. Pharmaceutical companies could benefit by extending the system to the marketing and legal departments.

Marketing may be more of a hands-off proposition in the pharmaceutical industry than, for example, it is in the automobile industry, where marketing tends to set product direction and development.

Marketing's potential to contribute to the R&D process was demonstrated in the case of a pharmaceutical company that was developing a drug to control high blood pressure. The drug was successful in its primary goal, but marketing personnel noticed that it also caused weight loss. Therefore the drug had a potential secondary market that was missed by the origi-

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nal development team, but which could have provided a lucrative potential revenue stream sooner than it did.

Because the potential legal liability incurred by the introduction of a new drug is large, the legal staff must also be able to have access to R&D information to try to anticipate problems related to safety or effectiveness.

If optical document systems offer such improvements in the drug manufacturing process, given the hundreds of millions of dollars at stake, why aren't all pharmaceutical companies clamoring to have systems in place? Several issues have to be resolved prior to the optical NDA becoming a full-blown reality: FDA funding, system standards, and man's inevitable preference for homeostasis.

FDA Funding

Despite special congressional budget approval for a separate department to speed up approval of AIDS-related drugs, the FDA is severely underfunded. This year's FDA information systems budget, according to an official there, is "about $3.5 million, with $2.5 million of that scheduled to be spent on hardware, but this represents a figure much higher than the average funds available historically, and it is not certain that next year we will be able to spend as much."

Even if the FDA had the money to invest in digital document systems, a lack of standards makes its selection of a single system difficult. The issue is especially problematic, since the FDA must service the approximately 156 companies in the U.S. actively involved in the drug R&D process. Those pharmaceutical firms will undoubtedly purchase systems that reflect their individual methods of research and development. The dilemma arises in that the FDA cannot afford to invest in incompatible equipment or to train their examiners on a variety of systems.

The same standards problem arises within the pharmaceutical companies themselves. "Standards are an issue," says a Squibb spokesperson, "since there is certainly the need to have interoperability within the corporation, but we don't have that now, since departments use a variety of document creation programs and microfilm still remains lacking in the standards arena."

Issues such as file structure and media size standards, which would allow media interchangeability, are problems, but indexing, screen layout, and database query facilities are more pressing problems. In fact, says a high-level spokesman for the FDA Center for Drug Evaluation and Research, in Washington, D.C., "The issue is not media interchangeability. What is vital is a standard software to manipulate the data portion of the image."

One of the biggest problems in setting standards for digital image systems is their conflict with expected advances in the technology. Some of those improvements may include expert system-type logic for the database query facility that would translate queries between multiple vendor environments. A natural language interface to statistical test results would allow researchers and FDA reviewers to recombine data to obtain new statistical findings. Improved scanning technology will allow the data portion of the image to be converted into a form that can be manipulated.

Standards at the physical level, as defined by ISO, are not likely to exist for several years. Still, an advisory body made up of FDA officials, pharmaceutical manufacturers, the vendor community, and pharmaceutical associations could take the first step toward uniformity by separating data standards from image standards, which would pave the way to further progress. This is not an application of technology that can wait to be sorted by standards committees or de facto standards; getting drugs approved quickly involves the welfare of the nation.

Given man's tendency to perpetuate the status quo, it is relatively easy for end users to review digital document systems and decide that the technology is not quite there yet or that the system cannot be cost-justified. Cost-justifying any piece of office automation equipment is a large task since many of the benefits are difficult to quantify. Just ask IS managers to cost-justify upgrading a System/36 to an AS/400.

The cost-justification problem for image systems can be overcome, however, as the Upjohn Co. of Kalamazoo, Mich., has found. "We will have several systems in the near future, but they will have to use our existing workstations in order to keep cost down on a per-user basis," says an Upjohn spokesperson. Before Upjohn can use its PCs as image workstations, however, it will have to equip them with add-in boards to provide upgraded communications, image compression/decompression, and between 2MB and 10MB of extra RAM.

We all talk about technology as a competitive advantage but rarely do we take the time to classify technologies into those that provide a tactical advantage and those that offer a strategic pathway to success in an industry. Image processing is that technology pathway of the '90s.

Some companies have recognized image processing as such. "This is a tightly knit community," says a representative of Hoescht-Celanese, New York, "and optical systems is the most frequently discussed topic at industry gatherings. Everyone is seriously looking at it, but the pharmaceutical industry is traditionally closed to outsiders, therefore no one wants to talk about what they're doing."

The fact is that the pioneers of this technology have a strategic advantage in an industry that has been traditionally reluctant to adopt any new technology. ICI Pharmaceuticals has a two-year lead over Warner Lambert, Glaxo, and Pfizer. The next tier of adopters are another 12 to 18 months behind those three. The question becomes, what further shot in the arm will it take for the rest of the industry to wake up? Or will they continue to behave like a child after a tetanus injection, thinking that, if they just sit on their hands, it won't hurt too much?

Up until now, pharmaceutical firms could have responded that way to a new technology with no ill effect, as success in the industry was predicated solely on the drug R&D and marketing efforts. As the spokesman for Warner Lambert indicates, however, the potential for image processing means that the most successful pharmaceutical companies will be those that take a leadership position in office systems technology.

Technology Hasn't Helped Yet

The average time required to get a drug approved has not shortened, although the worst-case situation has improved.

	1983	1984	1985	1986	1987
New Drug Applications	94	142	100	98	68
Average Approval Time*	14.7	18.7	22.1	21.6	27.0
Best Case	.9	1.5	2.6	1.2	2.9
Worst Case	93.3	131.3	121.0	127.5	87.3

Source: FDA, 1988

Approval times are measured in number of months.

Scott C. McCready is associate director of the optical disk systems market research group at CAP International, Norwell, Mass.

Street Savvy: Stanley Trades On Execution

"When it comes to computers, Morgan Stanley may not be doing anything that anybody else isn't doing. They're just doing it better," sums up one Wall Street wag. Right now, the $3 billion securities firm is the sweetheart of the Street. Analysts laud the company for its technological savvy.

Says Wall Street watcher Ted Withington, "There's no reason to believe that Morgan Stanley has discovered some kind of technology-tuned crystal ball for making money which no one else has. But by using computers very intelligently and in a disciplined way, you may be able to make better decisions. And there's reason to believe that's what Morgan is doing."

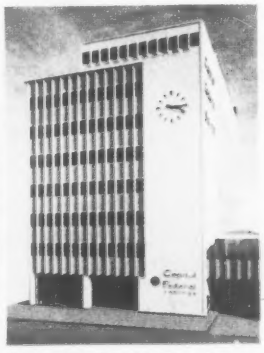
What Morgan does, it does very selectively and secretively. Working on the secret side are Morgan's "rocket scientists," crack economic mathematicians who devised many of the sophisticated trading techniques in play today. Its 700-member IS shop is experimenting with Sun and Apollo workstations, souping up the Unix machines for real-time data analysis in trading applications. While these and similar efforts are characterized as high-risk by the cautious company, they're clearly not in the megamillion dollar range. "There are no $40 million projects going on here," deadpans a Morgan IS employee. "There are a lot of little projects." Little projects that help make big business. "Morgan," says financial consultant Ed Perlin, "is an aggressive shop." ◀

Kansas Bank Pays Bills By Telephone

The Wizard of Oz has nothing on Eldon R. Flory, progressive senior vp of MIS at Capitol Federal S&L in Topeka. Eleven years ago, when most banks were still in the dark ages of automation, futurist Flory devised an electronic bill-paying system—one of the earliest of its kind in the U.S.

The system, updated to run on an IBM 4381 and a PC AT, enables customers' household and personal bills to be automatically deducted from their accounts.

Under the service, where all validation and updating is done on-line, Capitol Federal pays $10.8 million in bills a month, roughly translating into 26,000 checks and 85,000 payments a month. "We're paying three bills on every check," explains Flory, "which means we're collecting three service fees." When postage is deducted, the S&L is hauling in over $350,000 a year—a tidy sum for a bank that launched the service on a high-tech hunch over a decade ago.



Capitol Federal in Topeka.

Flory says phone payers, who have average balances of $2,300, become the bank's most loyal customers. By dialing an 800 number on a rotary or Touch-Tone phone, "you can pay every bill that you have—except one. We wouldn't recommend you pay your taxes with it," quips the visionary vp. ◀

INSURANCE INDUSTRY SPENDING IN SOFTWARE AND SERVICES

Delivery Mode	1986 ($M)	1987 ($M)	1988 ($M)	1989 ($M)	1990 ($M)	1991 ($M)	1992 ($M)
Processing/ Network Services							
Remote Comp/ Batch Facility	344	395	450	509	570	638	707
Management	361	397	437	480	528	581	639
Total Processing Services	705	792	887	989	1,098	1,219	1,346
Applications Software							
Mainframe/ Minicomputer	282	335	395	458	527	601	687
Microcomputer	109	147	191	241	294	353	431
Total Applications Software	391	482	586	699	821	954	1,118
Turnkey Systems	179	204	233	263	295	327	360
Professional Services	894	1,054	1,174	1,331	1,544	1,858	2,239
Sector Total	2,169	2,532	2,880	3,282	3,758	4,358	5,063

Source: Input, Mountain View, Calif.

Getting More Experts In Insurance

Insurance companies, which avoid risk like the plague, increasingly are calling on expert systems to cover their assets. In 1987, two out of three top 100 U.S. insurance companies were either using, developing, or researching expert systems, according to a Coopers & Lybrand survey.

The Big Eight firm found that underwriting was the biggest application area for artificial intelligence (AI) among large insurers. Marketing/sales support and personal financial planning applications also were of interest to life and health insurers, while claims, investment, and risk/product matching were popular expert systems usages among property and casualty companies.

Investment applications have become even more widespread, according to Coopers & Lybrand's 1988 study of the broader financial services sector, which views the insurance industry as the leader in the AI arena.

Helping substantiate these perceptions are firms such as Fireman's Fund Insurance Co., San Rafael, Calif. Fireman's, which has one of the first commercial expert systems in production (IBM's Expert System Environment). Fireman's has pioneered the use of AI in underwriting. ◀

HOW MINICOMPUTERS ARE USED IN BANKS

Source: American Bankers Assn., Computers in Banking, 1987